United States Patent [19]

Myer

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[54] **MECHANICALLY ACTUATED MAGNETOCRYSTALLINE COUNTER**

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[52] **U.S. Cl.** ..... **340/174 TF;** 235/92 MT; 235/92 R

[51] **Int. Cl.**[2] **G11C 11/14**

[58] **Field of Search** ..... 235/92 MC, 92 EL, 92 MT, 235/92 MP, 92 EA, 92 SH, 103; 340/174 TF; 324/142

[56] **References Cited**

UNITED STATES PATENTS

3,624,361	11/1971	Rossi et al.	235/92 EL
3,825,910	7/1974	Carr et al.	340/174 TF
3,845,282	10/1974	Mattson	235/92 EA
3,895,363	7/1975	Braginski et al.	340/174 TF

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[57] **ABSTRACT**

There is disclosed a miniaturized mechanically actuated magnetocrystalline counter comprising a shift register formed in a known manner on a crystal platelet of uniaxially anisotropic material. The device is suitable for use in counting a series of mechanical events such as the rotation or reciprocation of a mechanical member. Particular examples include the rotation of the unit counter of a utility meter or the reciprocation inherent in the recoil of a discharged weapon. Direct actuation of the counter by the occurrence of the mechanical event is achieved by using a permanent magnet as a transducer. The magnet is mounted to be moved with respect to the platelet responsively to the mechanical event to be counted in such a fashion that it generates a cyclically moving magnetic field to propagate at least one movable magnetic domain through the serial shift register formed in the platelet forming a bit stream which digitally accumulates data representative of the series of mechanical events. Each cycle of the field motion is produced by one of said series of mechanical events and each cycle so produced produces a single bit in said stream either by generating an additional magnetic domain and propagating all prior domains foward or, if only one domain is used, by simply indexing it forward. Any suitable means to readout the accumulated count in the shift register may be used either for direct reading or for remotely controlled electronic reading. The latter technique is particularly suited for remote reading of utility meters where the counter is driven by rotation of the pointer of the units dial of the meter.

11 Claims, 10 Drawing Figures